

What is claimed is:

1. A real-time stereo image matching system comprising:  
2. a signal converting means for converting an image input from a first camera  
3. and a second camera into a digital signal; and  
4. an image matching means for calculating a determined matching cost based  
5. on a pair of pixels in one scan line of the first and second digital image signals,  
6. tracing the decided value which determines the minimum matching cost, and  
7. outputting the decided value as an estimated disparity according to predetermined  
8. activation information.

1. The real-time stereo image matching system of claim 1, wherein the  
2. image input to the signal converting means is obtained by the first camera and  
3. second camera that have optical axes parallel to each other and have the focal  
4. planes on the same plane.

1. The real-time stereo image matching system of claim 1, wherein in the  
2. image matching means, the calculation of the matching cost is calculated after  
3. occlusion information in which pixels do not match in the scan line is added to the  
4. first pixel and the second pixel.

4. The real-time stereo image matching system of claim 1, wherein the  
1. image matching means further comprises:  
3. a first storage means for storing the digital image pixels from the first camera;  
4. a second storage means for storing the digital image pixels from the second  
5. camera;  
6. a processing means for outputting a predetermined estimated disparity using  
7. pixels input from the first storage means and second storage means; and  
8. a clock control means for providing a clock signal for controlling the  
9. operations of the first and second storage means and the processing means.

1        5. The real-time stereo image matching system of claim 4, wherein the  
2 system is formed of N processing means, N/2 first storage means, and N/2 second  
3 storage means (Here, N is a multiple of 2).

1        6. The real-time stereo image matching system of claim 5, wherein the  
2 processing means exchanges information with neighboring processing means.

1        7. The real-time stereo image matching system of claim 5, wherein  
2 among the N processing means, only the processing means that outputs a  
3 predetermined disparity is activated and the remaining processing means are in  
4 high impedance states.

1        8. The real-time stereo image matching system of claim 4, wherein  
2 the first storage means and the second storage means are initialized when the  
3 processing means completes processing of pixels in one scan line.

1        9. The real-time stereo image matching system of claim 4, wherein a  
2 pixel stored in the first storage means is delayed by (N/2-1) clock cycles compared  
3 to a pixel stored in the second storage means.

1        10. The real-time stereo image matching system of claim 4, wherein the  
2 clock control means outputs a first clock signal for the even-numbered processors  
3 and the second storage means, and a second clock signal for the odd-numbered  
4 processors and the first storage means.

1        11. The real-time stereo image matching system of claim 4, wherein the  
2 processing means comprises:

3        a forward processor for receiving a pixel of one scan line in the first storage  
4 means and the second storage means, and outputting a determined matching cost  
5 and a decision value;

6        a decision storage means for storing the decision value output from the  
7 forward processor; and

8           a second processor for outputting a determined disparity, using the decision  
9       value output from the decision storage means according to the determined  
10      activation information.

1           12.    The real-time stereo image matching system of claim 11, wherein  
2       when a write control signal is input from outside, the first processor operates, and  
3       when a read control signal is input from outside, the second processor operates.

1           13.    The real-time stereo image matching system of claim 11, wherein the  
2       decision storage means has a last-in first-out structure in which the decided value  
3       that is output last from the first processor is first input to the second processor.

1           14.    The real-time stereo image matching system of claim 11, wherein the  
2       first processor comprises:

3           a matching cost calculating means for calculating a matching cost, using a  
4       pixel of one line in the first storage means and the second storage means;

5           a first adding means for adding the calculated matching cost to the feed-back  
6       accumulated cost;

7           a comparing means for comparing the output of the first adding means with  
8       the costs of neighboring processing means, and then outputting the minimum cost  
9       and decision value;

10          a storage means for storing the minimum cost that is the result of the  
11       comparison, as the accumulated cost; and

12          a second adding means for adding the entire cost and occlusion cost, and  
13       then outputting the result to neighboring processing means.

1           15.    The real-time stereo image matching system of claim 11, wherein the  
2       second processor comprises:

3           a logical OR means for performing OR-ing the activation information of the  
4       neighboring processing means and the feed-back activation information route;

5           a register for storing the last activation information and that is the result of the  
6       OR-ing;

7           a demultiplexing means for demultiplexing the last activation information  
8   according to the decision value output from the decision storage means to output to  
9   the neighboring processing means and feed back to the logical OR means; and  
10          a tri-state buffer for outputting the decision value output from the decision  
11   storage means, as a determined disparity, according to the activation information of  
12   the register.

1           16.   The real-time stereo image matching system of claim 17, wherein the  
2   output from the decision storage means controls which direction the demultiplexing  
3   means passes the activation information.